SPHENIX EMCAL Update

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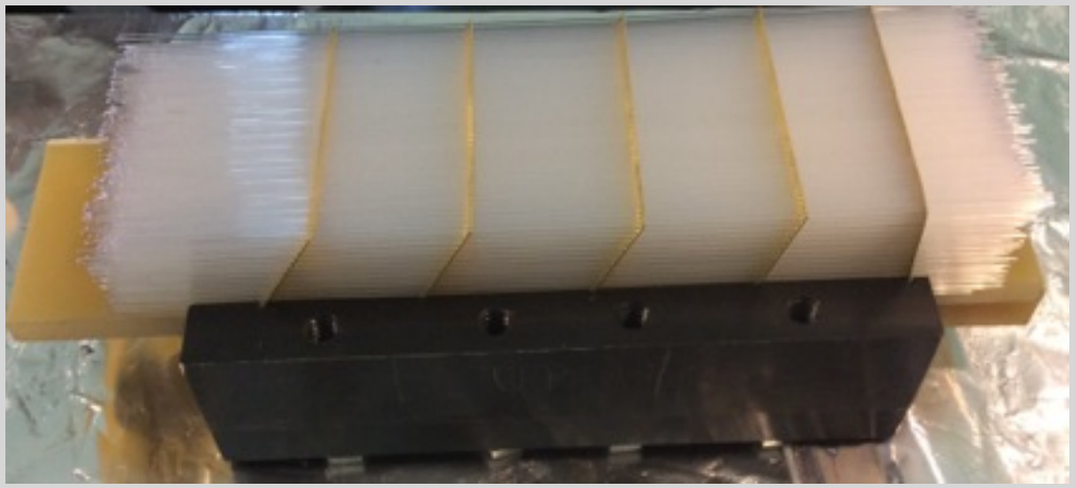
Outline of Presentation

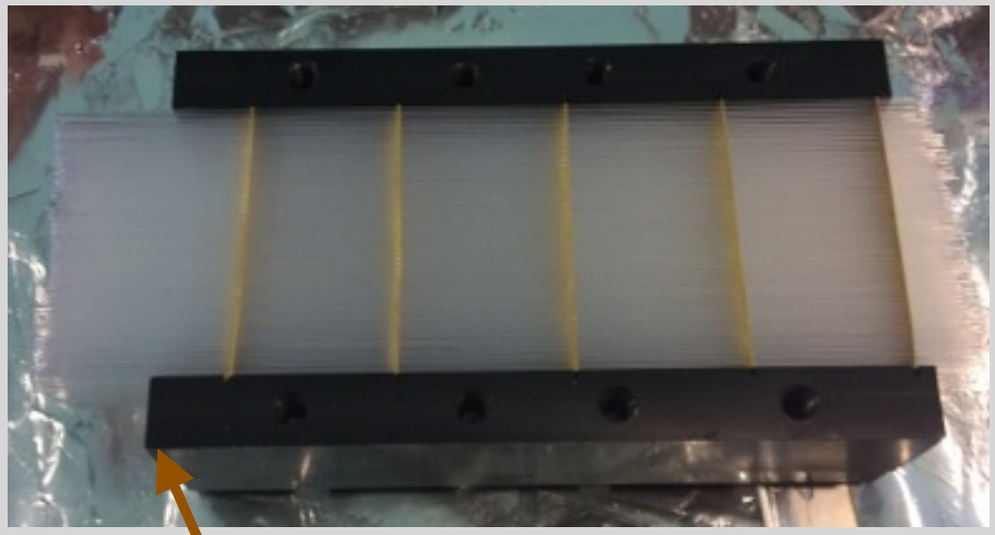
- Single module build process
- Final density values
- Improvements/lessons learned for next design

Meshes/fibers inside mold

The fibers with meshes are placed in the mold. A small board is used for mesh placement then carefully removed. This is done so the meshes are easier to place.



small board used for placement

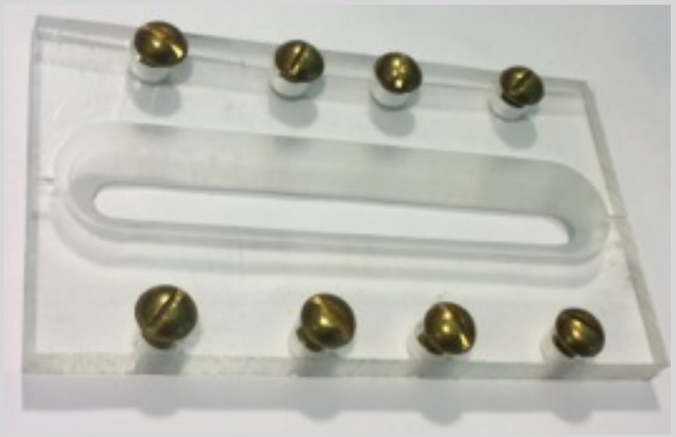


board is removed

Tungsten fill

The Tungsten poured into a slot to see the fill level. At this time a vibration table is used to settle the powder.

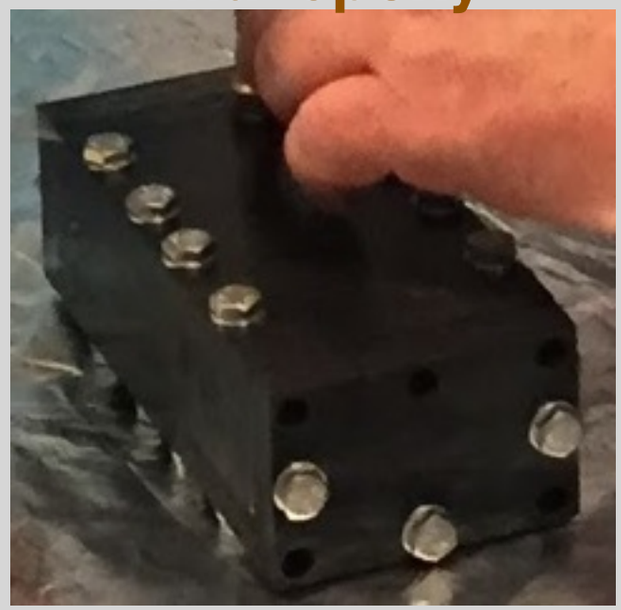
top used to fill Tungsten



mold filled with Tungsten

fabric pieces are added to prevent Tungsten from being pulled out in the vacuum

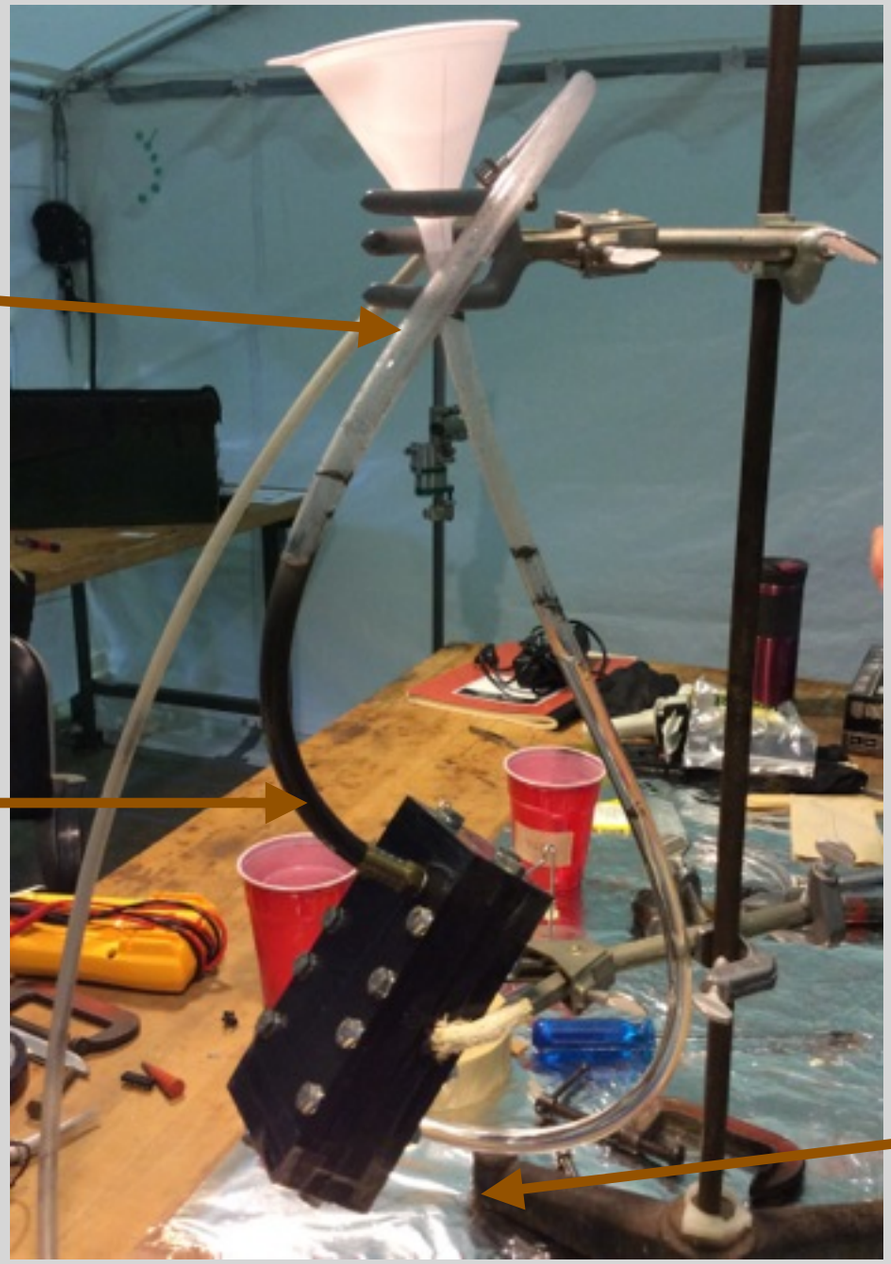
top changed for final epoxy



Epoxy Mix Added / Vacuum Pump

The epoxy is fed through the bottom of the module and the vacuum pump pulls the epoxy through.

epoxy vacuumed out the top



Tungsten powder is also removed, possibly because the fabric slipped.

epoxy fed through the bottom port

Opening the mold after epoxy fill

top view

peeling back the filter paper

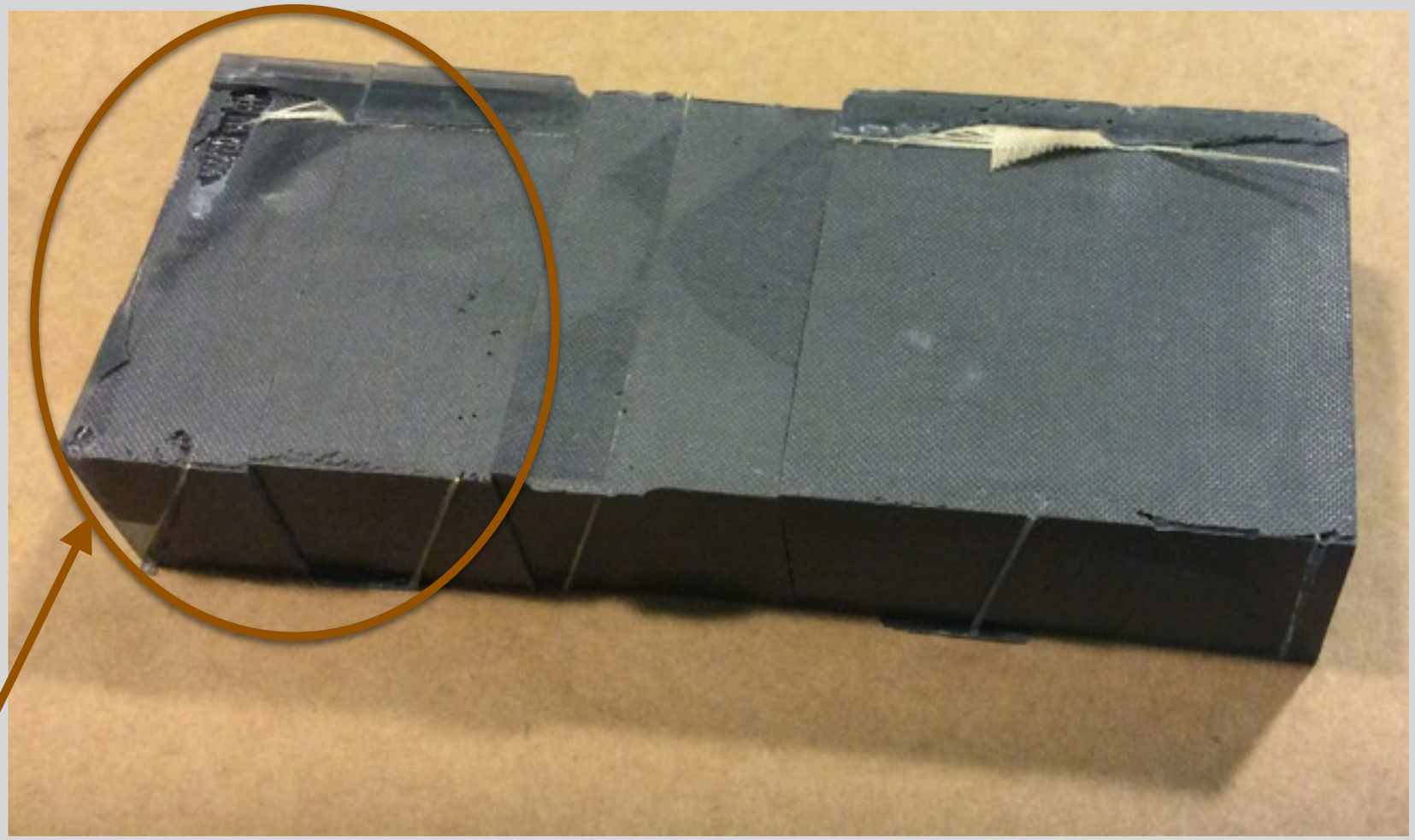
bottom view

side view

side view closeup

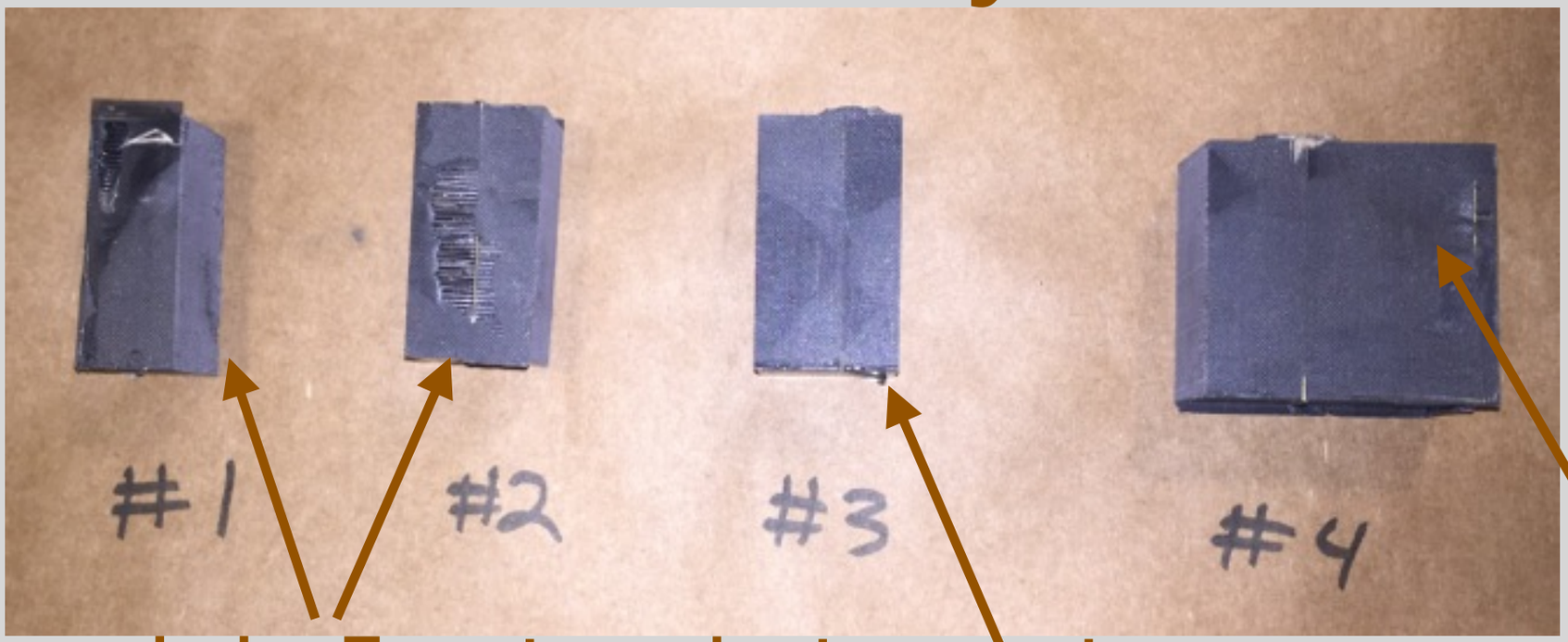
Final Module

The final module after being removed from the mold.
Tungsten is missing from the far left of the module.



Tungsten powder is missing here

Final Density Values



missing Tungsten

best segment

pocket of missing Tungsten

seg #	Volume (cm^3)	Mass(g)	**Density (g/cm^3)**	**% Difference**
#1	34.8	119.6	**3.43**	**88.6%**
#2	36.5	197.7	**5.42**	**48.5%**
#3	41.3	358	**8.67**	**2.5%**
#4	87.7	715	**8.15**	**8.6%**

BNL density value: 8.89g/cm^3

#1: missing Tungsten, mostly epoxy

#2: missing Tungsten

#3: best segment

#4: pocket of missing Tungsten, epoxy end included

Density Calculations segment #3

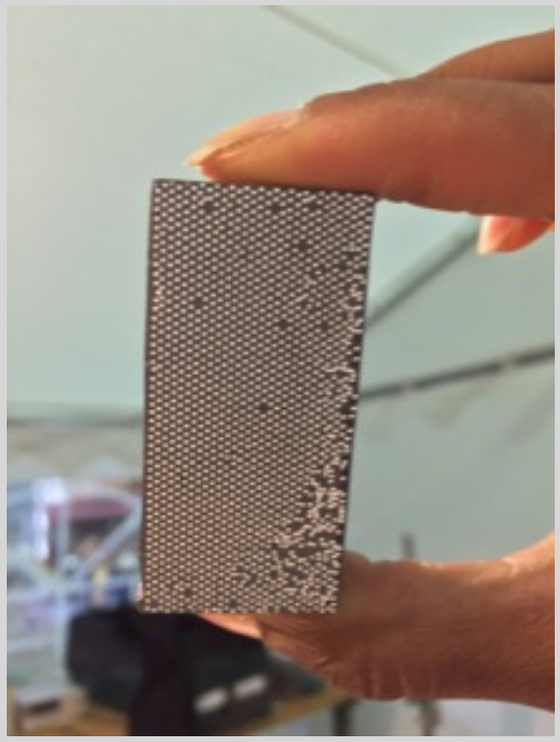
volume of segment #3: 5.3cmx2.6x3.0=41.3cm^3

mass=358g

density=358g/41.3cm^3=**8.67g/cm^3**

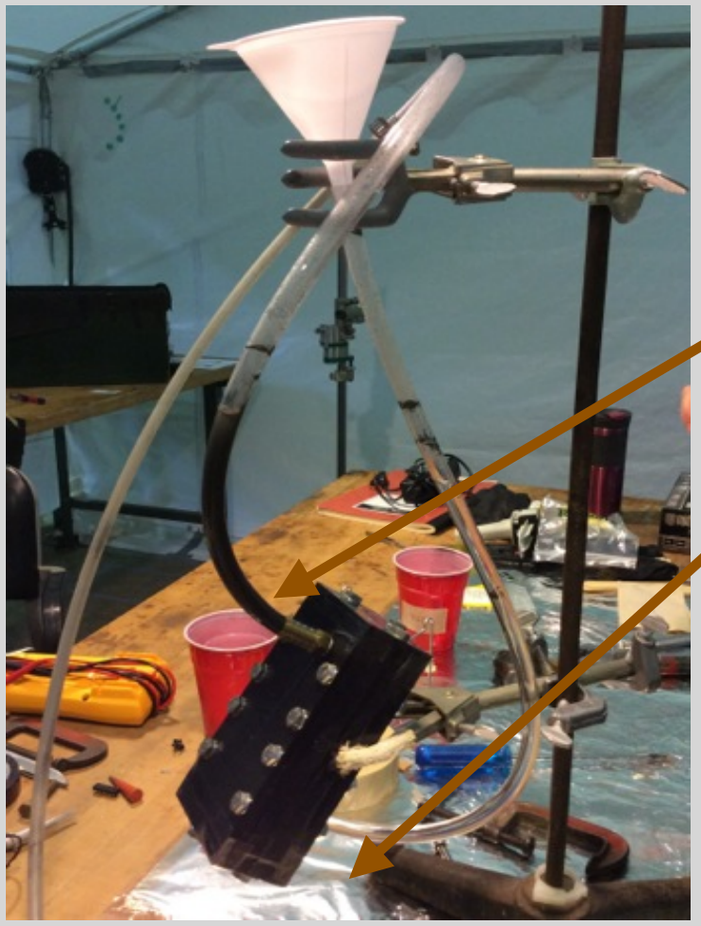
Goal from BNL:8.89g/cm^3

% difference: |8.67-8.89|/(0.5(8.67+8.89))x100=**2.5%**

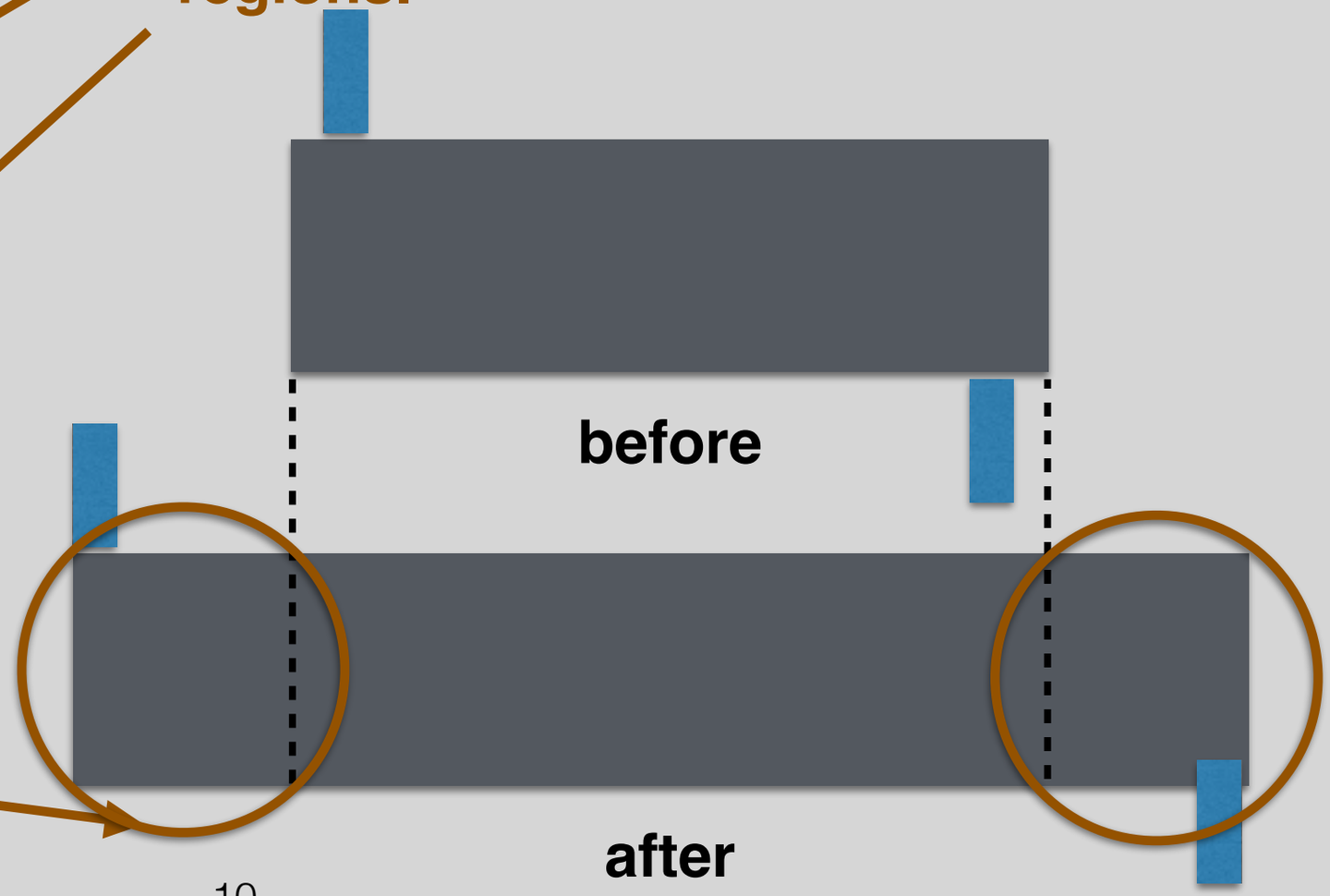


Lessons learned / Improvements for next module

We plan to fix the regions that have low Tungsten by extending the port openings pass the length of the module.



Extend these ports and make the mold longer, then cut off the outer regions.



Machine off the end regions